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Nakashima et al.

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(54) **POWER STORAGE UNIT, CORRECTION METHOD FOR CAPACITY VALUES OF STORAGE BATTERIES, AND POWER STORAGE SYSTEM**

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H02J 3/32	(2006.01)
H02J 7/35	(2006.01)
H01M 10/0525	(2010.01)
H01M 10/42	(2006.01)

(52) **U.S. Cl.**
CPC ***H02J 7/0019*** (2013.01); *H01M 10/0525* (2013.01); *H01M 2010/4271* (2013.01); *H02J 3/32* (2013.01); *H02J 7/35* (2013.01); *Y02E 10/766* (2013.01)

(58) **Field of Classification Search**
CPC H02J 7/00
USPC 320/126
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2009/0102422	A1*	4/2009	Naganuma et al.	320/118
2010/0237828	A1*	9/2010	Maegawa	320/118
2011/0279088	A1*	11/2011	Yamamoto et al.	320/134
2012/0056594	A1*	3/2012	Yanagihara et al.	320/134
2012/0249071	A1*	10/2012	Yang	320/110

FOREIGN PATENT DOCUMENTS

JP	2002-168933		6/2002
JP	2008-271759	A	11/2008
WO	9504937	A	2/1995

* cited by examiner

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(57) **ABSTRACT**

A power storage unit is provided which is able to facilitate recalibration and which is able to supply power even while recalibration is being performed. A method for correcting the capacity values of storage batteries, and a power storage system are also provided. In the power storage unit, a control unit turns ON a portion of the switches to connect a portion of the storage batteries to the charge and discharge path for correction, and corrects the capacity value of the portion of storage batteries by charging and discharging the portion while the other switches are turned OFF to disconnect the other storage batteries from the charge and discharge path.

7 Claims, 9 Drawing Sheets

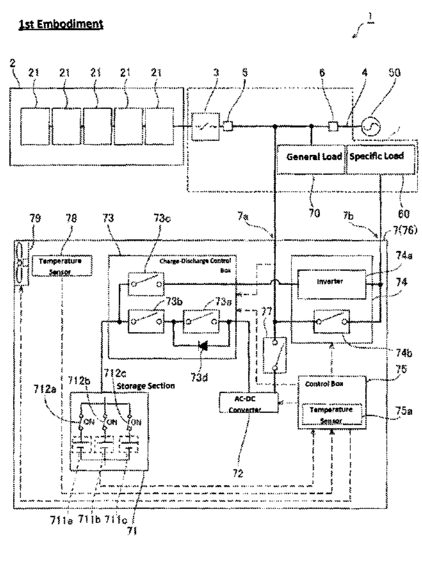


FIG. 1

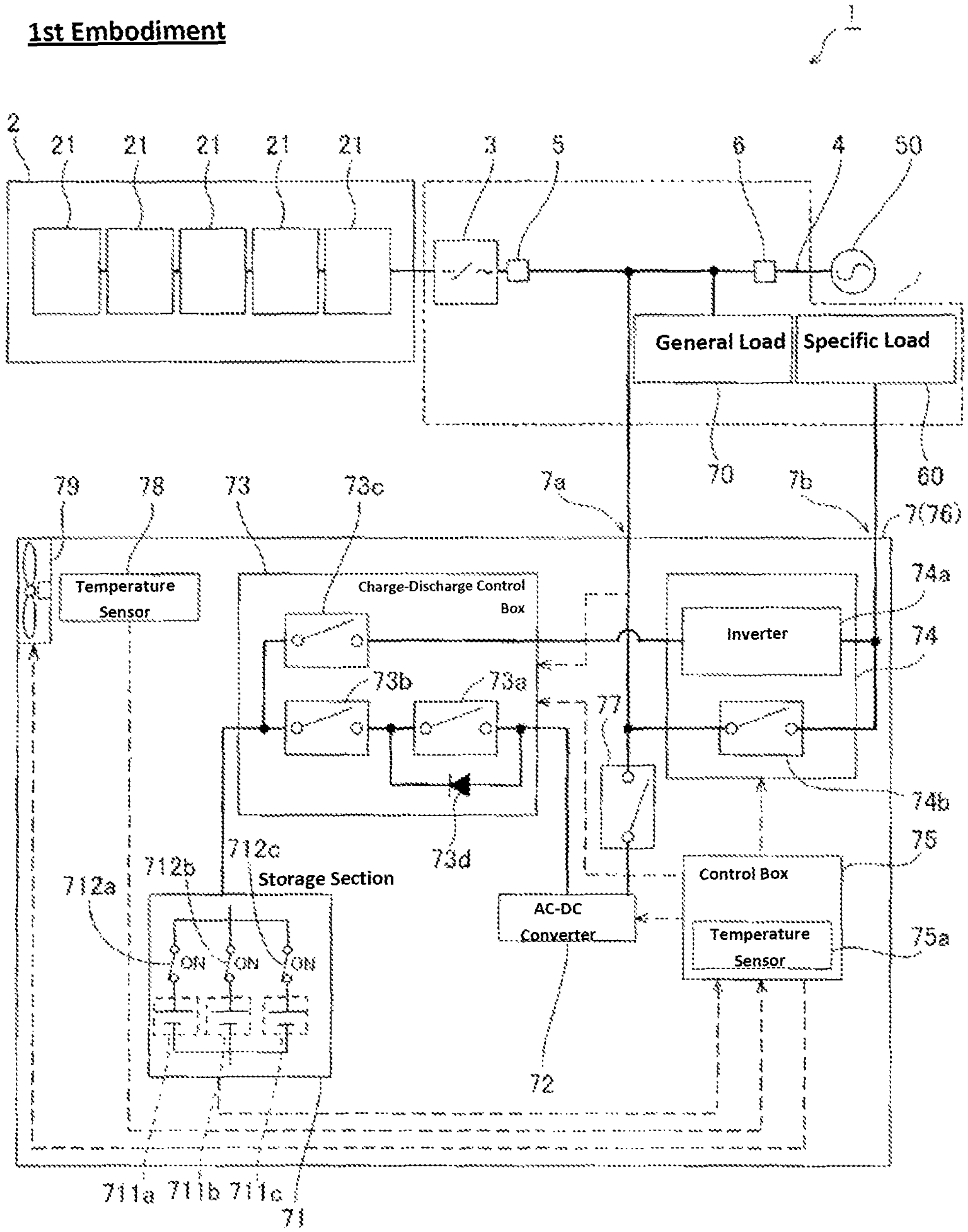

1st Embodiment
1
2
21
21
21
21
21
3
5
6
4
50
General Load
Specific Load
70
60
79
78
73
73c
7a
7b
7(76)
Temperature Sensor
Charge-Discharge Control Box
74a
Inverter
74
73b
73a
77
74b
73d
712c
75
712b
Storage Section
Control Box
712a
ON
ON
ON
AC-DC Converter
Temperature Sensor
75a
72
711a
711b
711c
71

FIG. 2

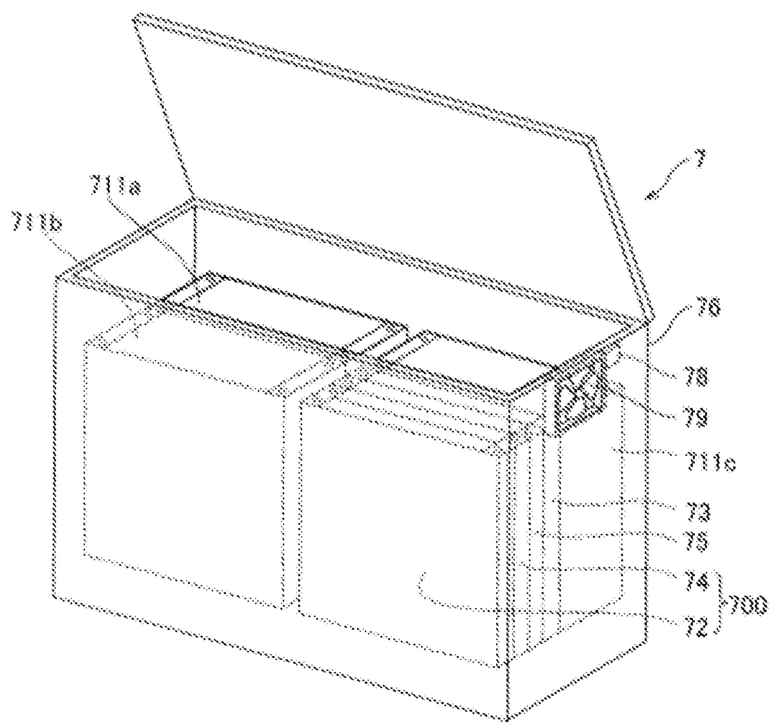


FIG. 3

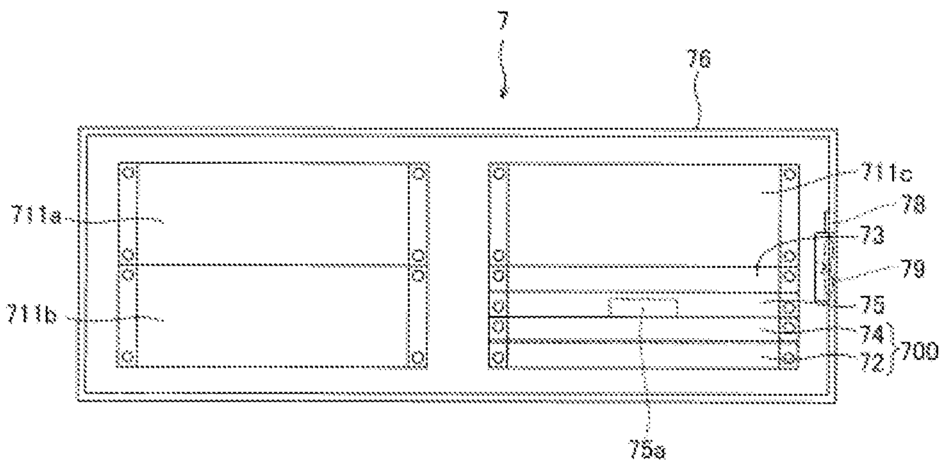


FIG. 4

1st Embodiment

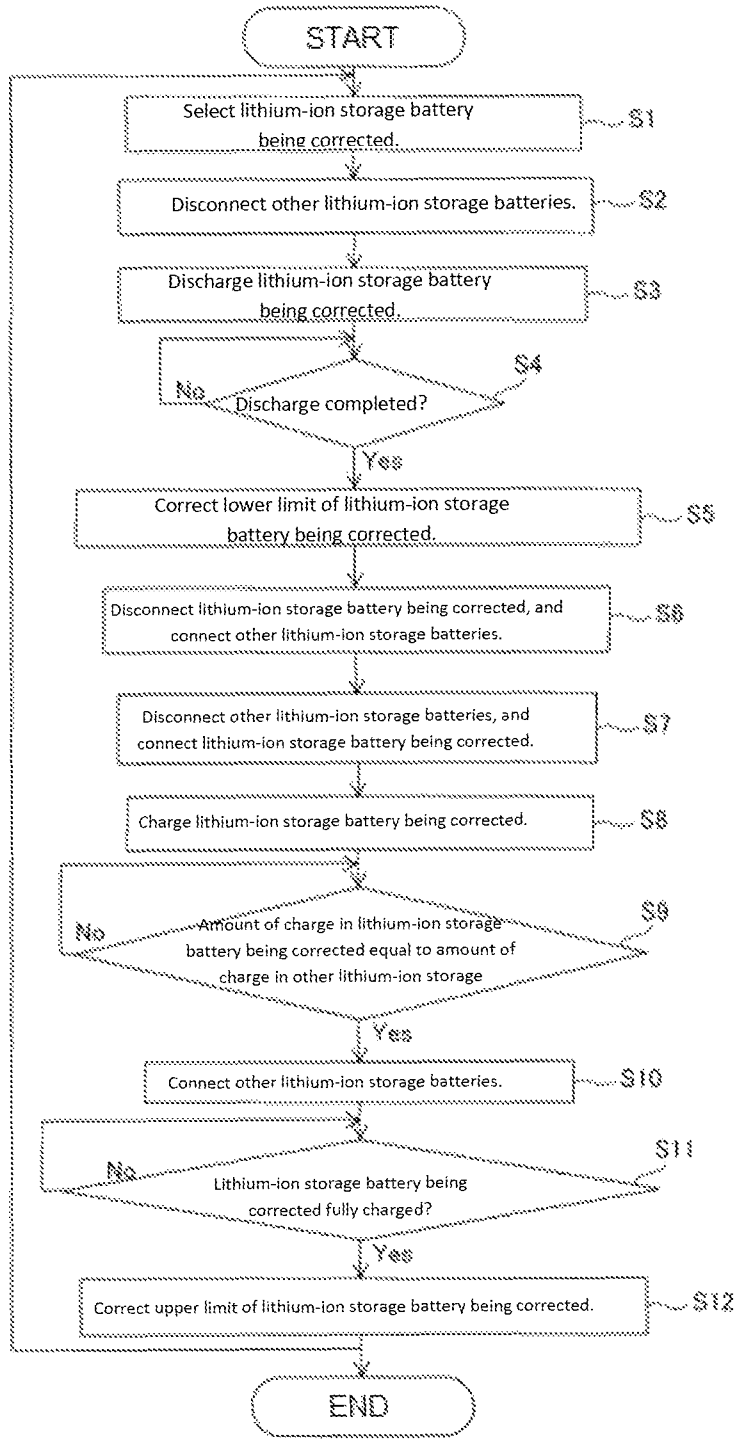


FIG. 5

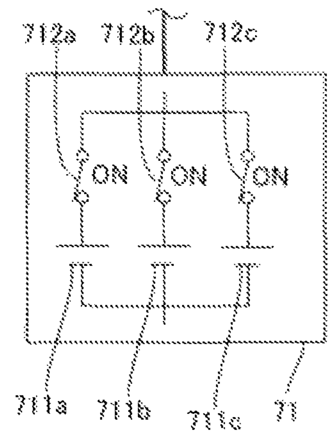


FIG. 6

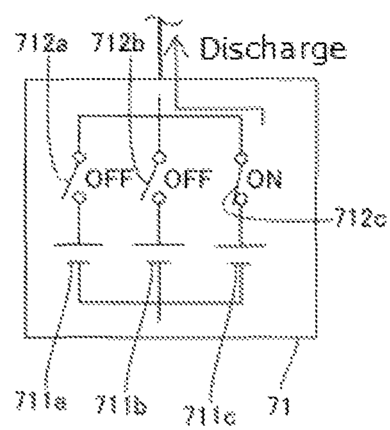


FIG. 7

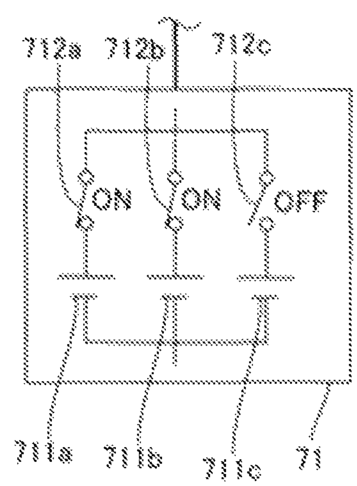


FIG. 8

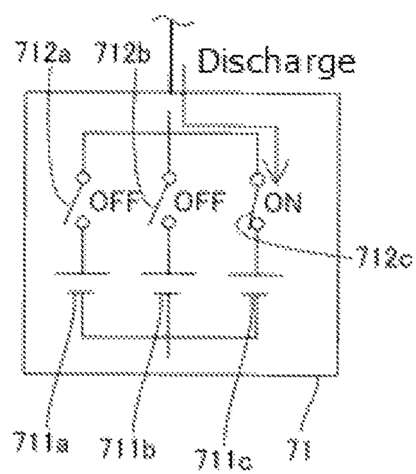


FIG. 9

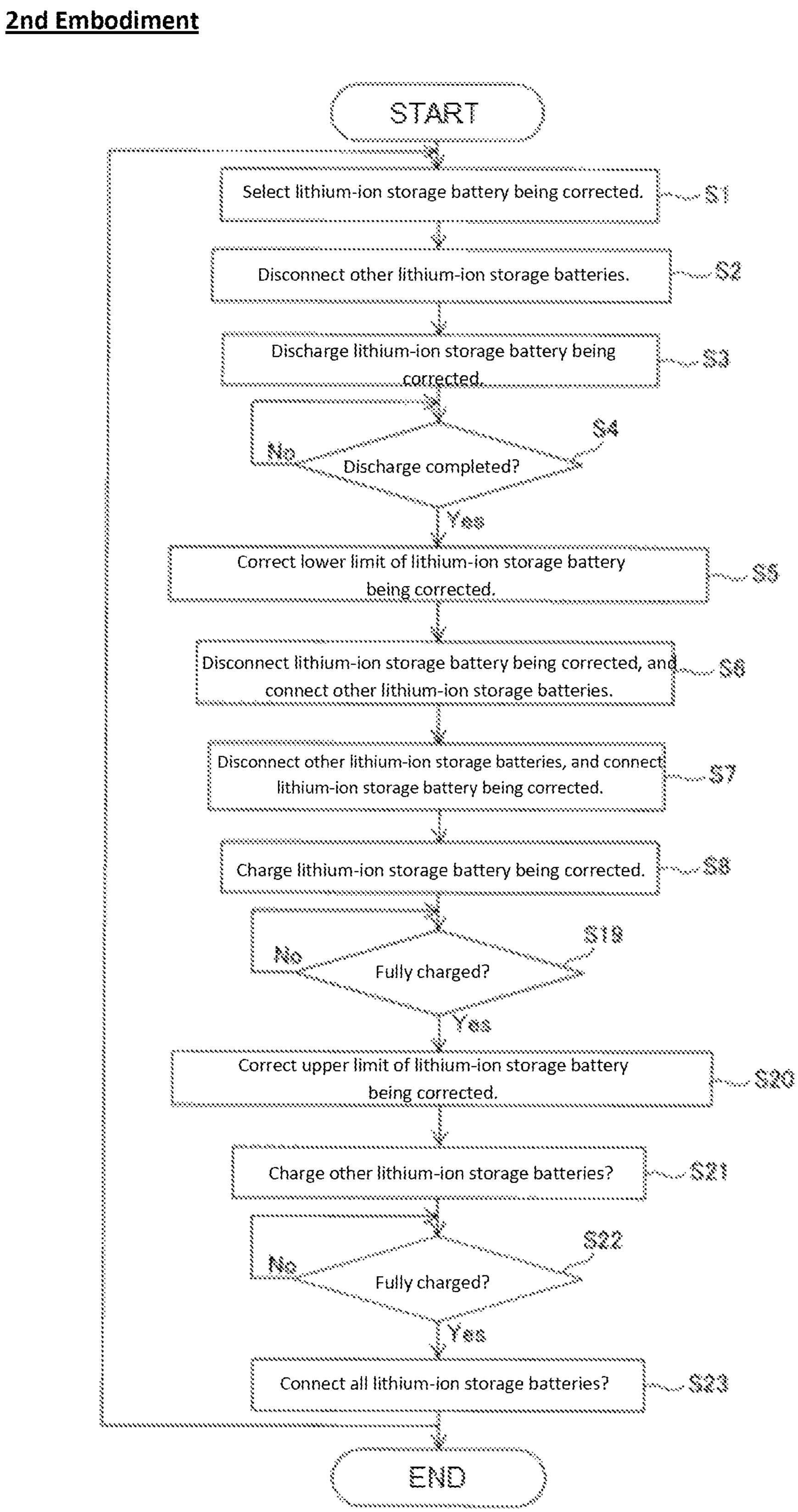

2nd Embodiment
START
Select lithium-ion storage battery being corrected.
S1
Disconnect other lithium-ion storage batteries.
S2
Discharge lithium-ion storage battery being corrected.
S3
Discharge completed?
S4
No
Yes
Correct lower limit of lithium-ion storage battery being corrected.
S5
Disconnect lithium-ion storage battery being corrected, and connect other lithium-ion storage batteries.
S6
Disconnect other lithium-ion storage batteries, and connect lithium-ion storage battery being corrected.
S7
Charge lithium-ion storage battery being corrected.
S8
Fully charged?
S19
No
Yes
Correct upper limit of lithium-ion storage battery being corrected.
S20
Charge other lithium-ion storage batteries?
S21
Fully charged?
S22
No
Yes
Connect all lithium-ion storage batteries?
S23
END

FIG. 10

3rd Embodiment

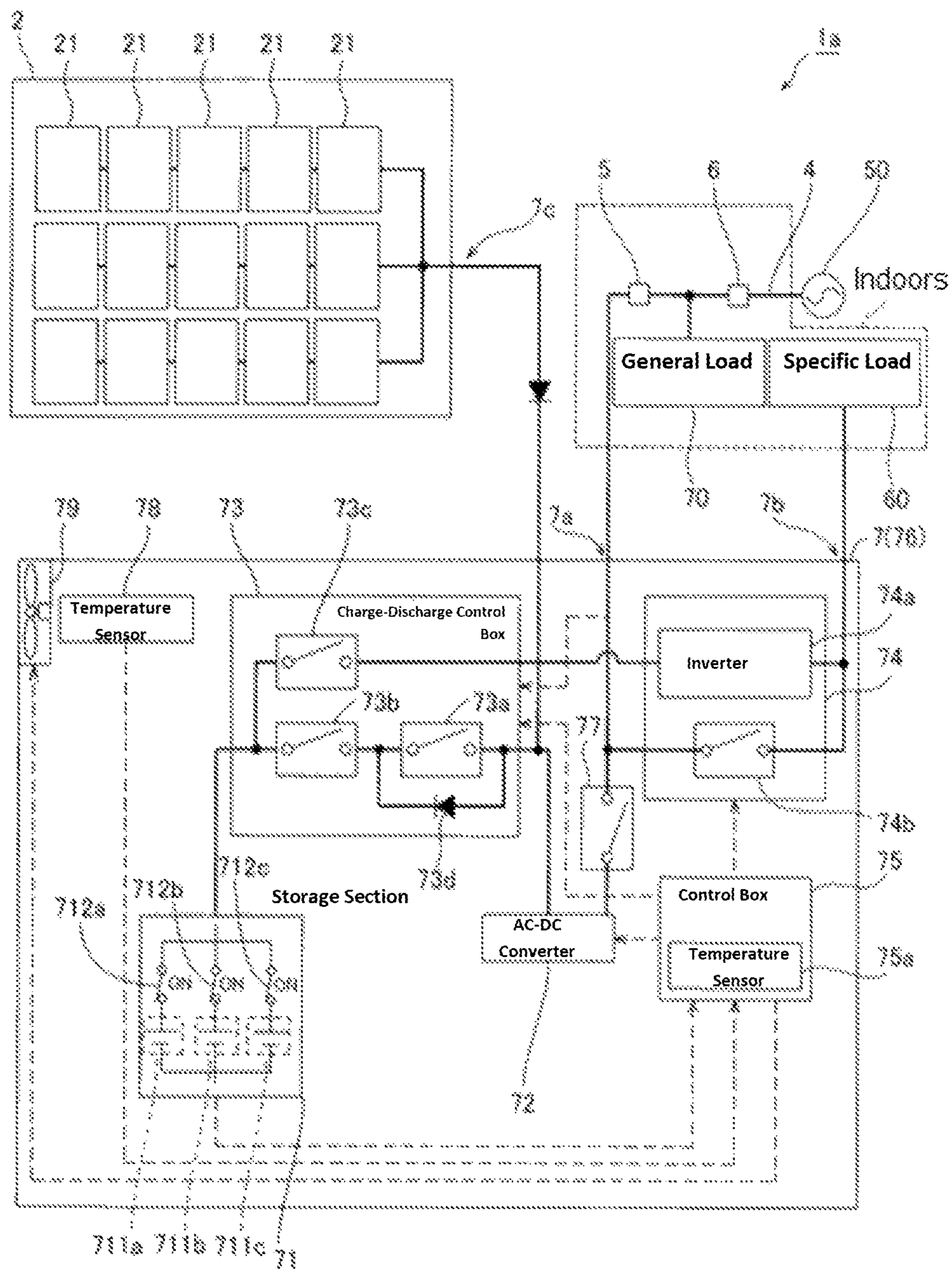
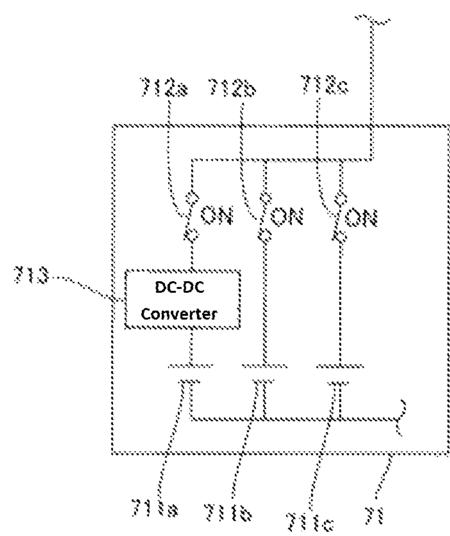


FIG. 11



POWER STORAGE UNIT, CORRECTION METHOD FOR CAPACITY VALUES OF STORAGE BATTERIES, AND POWER STORAGE SYSTEM

FIELD OF THE INVENTION

The present invention relates to a power storage unit, a correction method for the capacity values of storage batteries, and a power storage system. The present invention relates more specifically to a power storage unit including a plurality of storage batteries, a correction method for the capacity values of storage batteries, and a power storage system.

BACKGROUND

Systems that use storage batteries have been put into practical use in order to effectively utilize renewable energy and nighttime power. These storage batteries are typically nickel hydrogen storage batteries or lithium-ion storage batteries, which have excellent properties such as charge and discharge efficiency. However, as in the case of lead storage batteries, it can be difficult to manage the remaining power in these storage batteries using voltage. Therefore, nickel-hydrogen and lithium-ion storage batteries have been developed with power-level gauges, and these power-level gauges are used to manage the remaining power in storage batteries and deterioration of the storage batteries. However, errors are known to occur in power-level gauges, so a means has been proposed to periodically correct errors that have occurred in these gauges (recalibration). A means for correcting errors that have occurred in power-level gauges has been disclosed in Japanese Laid-open Patent Publication No. 2008-271759 (A).

In the method disclosed in Japanese Laid-open Patent Publication No. 2008-271759 (A), a rechargeable battery is forcibly discharged, the capacity (lower capacity) of the rechargeable battery is corrected after the discharge, the rechargeable battery is charged, and the capacity (upper capacity) of the rechargeable battery is corrected after the charge to complete the recalibration.

Also, the power storage systems for storing power for renewable energy and nighttime power often include a plurality of storage batteries in order to be able to store a larger amount of power than is consumed by the expected load. This enables the power storage system to operate when there is insufficient daylight or when a power outage occurs. It also extends the life of the storage batteries because the depth of discharge is not very high.

PRIOR ART REFERENCES

Patent Document 1: Published Unexamined Patent Application No. 2008-271759 (A)

SUMMARY

However, when the recalibration method disclosed in Japanese Laid-open Patent Publication No. 2008-271759 (A) is used on a large-capacity storage battery group including a plurality of storage batteries, the storage batteries have to be completely discharged, and this requires a considerable amount of time because the overall capacity of the plurality of storage batteries is substantial. In a system including a large-capacity storage battery group having a greater capacity than the amount of power consumed by the load, such as a street light which must store enough power for the load to consume over several days to ensure against periods of insufficient daylight, the storage batteries cannot be completely discharged when power is being consumed such as overnight. As a result, a storage battery group has to be completely discharged over an extended period of time. Because charging, for example, with renewable energy has to be performed during this time, recalibration is difficult to perform. In the recalibration method disclosed in Japanese Laid-open Patent Publication No. 2008-271759 (A), the power battery group has to be completely discharged during recalibration. Therefore, power cannot be supplied from the storage battery group when the storage battery group has been completely discharged.

A purpose of the present invention is to solve this problem by providing a power storage unit, correction method for the capacity values of storage batteries, and a power storage system which are able to facilitate recalibration and which are able to supply power even while recalibration is being performed.

In order to achieve this purpose, the first aspect of the present invention is a power storage unit including a plurality of storage batteries connected in parallel via a charge and discharge path and a plurality of switches, and a control unit for ON/OFF control of the plurality of switches. In this power storage unit, the control unit turns ON a portion of the plurality of switches to connect a portion of the plurality of storage batteries to the charge and discharge path for correction, and corrects the capacity values of the portion of the plurality of storage batteries by charging and discharging the portion while the other switches are turned OFF to disconnect the other storage batteries from the charge and discharge path.

The second aspect of the present invention is a method for correcting the capacity values of a plurality of storage batteries connected in parallel via a charge and discharge path and a plurality of switches. This method includes a step for controlling the plurality of switches to connect at least a portion of the plurality of storage batteries to the charge and discharge path for correction, and to disconnect the other storage batteries from the charge and discharge path, a step for almost completely discharging the storage batteries of the portion to correct the lower limit of the capacity of the storage batteries of the portion, and a step for almost completely charging the storage batteries of the portion to correct the upper limit of the capacity of the storage batteries of the portion.

The third aspect of the present invention is a power storage system provided with a power storage unit that includes: a charge and discharge path connected to a power system, an electric generator generating power using renewable energy, and a load; a plurality of storage batteries connected in parallel via the charge and discharge path and a plurality of switches; and a control unit for ON/OFF control of the plurality of switches to control the charging and discharging of the plurality of storage batteries. In this power storage system, the control unit of the power storage unit turns ON a portion of the plurality of switches to connect a portion of the plurality of storage batteries to the charge and discharge path for correction, and, after turning OFF the other switches to disconnect the other storage batteries from the charge and discharge path, and discharging power from the portion of storage batteries to the load, corrects the capacity values of the portion of storage batteries by charging the portion of storage batteries using either the power system or the electric generator.

In the present invention, as mentioned above, a portion of the plurality of storage batteries is connected to the charge and discharge path for correction, and the capacity values of the portion of storage batteries being corrected are corrected by charging and discharging the portion of storage batteries while the other storage batteries that are not being corrected are disconnected from the charge and discharge path. In this way, the time required to charge and discharge the storage batteries is shorter than the time required to correct capacity values by completely charging and discharging a plurality of storage batteries. As a result, the capacity values of a portion of the storage batteries can be corrected relatively easily, even during situations in which long-term discharge is not possible such as during a power outage. By discharging the portion of storage batteries that are being corrected in order to correct the capacity values in this portion of storage batteries, power can be retained in the storage batteries that are not being corrected. As a result, power can be supplied from the other storage batteries while the correction values in this portion of storage batteries are being corrected, even when the portion of storage batteries has been completely discharged. Here, a storage battery is not necessarily a single cell. It can also be a single battery pack including a plurality of cells and a power-level gauge.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram showing the configuration of the power storage system in a first embodiment of the present invention;

FIG. **2** is a perspective view showing a power storage unit of the power storage system in the first embodiment of the present invention;

FIG. **3** is a top view showing a power storage unit of the power storage system in the first embodiment of the present invention;

FIG. **4** is a flowchart used to explain the recalibration operation for a power storage unit in the first embodiment of the present invention;

FIG. **5** is a circuit diagram of a power storage unit in the first embodiment of the present invention showing a situation in which three lithium-ion storage batteries have been connected;

FIG. **6** is a circuit diagram of a power storage unit in the first embodiment of the present invention showing a situation in which the lithium-ion storage battery being corrected is being discharged;

FIG. **7** is a circuit diagram of a power storage unit in the first embodiment of the present invention showing a situation in which the lithium-ion storage batteries other than the one being corrected have been connected;

FIG. **8** is a circuit diagram of a power storage unit in the first embodiment of the present invention showing a situation in which the lithium-ion storage battery being corrected is being charged;

FIG. **9** is a flowchart used to explain the recalibration operation for a power storage unit in a second embodiment of the present invention;

FIG. **10** is a block diagram showing the configuration of a power storage system in a third embodiment of the present invention; and

FIG. **11** is a block diagram showing the configuration of a power storage unit in a variation on the first through third embodiments of the present invention.

DETAILED DESCRIPTION

The following is an explanation of embodiments of the present invention with reference to the drawings.

1st Embodiment

The configuration of the power storage system **1** in the first embodiment of the present invention will be explained first with reference to FIG. **1**.

As shown in FIG. **1**, the power storage system **1** in the first embodiment of the present invention includes a generated-power output unit **2** for outputting power generated using sunlight, an inverter **3** connected to a power system **50** for outputting power from the generated-power output unit **2**, and a bus line **4** connecting the inverter **3** and the power system **50**. A power detection unit **5** for detecting the level of power outputted from the generated-power output unit **2** (power level of the photovoltaic module **21**) and a power detection unit **6** for detecting power coming into and going out of the power storage system **1** (power bought and sold) are provided on the bus line **4**. A power storage unit **7** including a power storage section **71** is connected to the bus line **4** via wiring **7***a*, and a specific load **60** is connected to the power storage unit **7** via wiring **7***b*. A general load **70** is also connected to the bus line **4**. The bus line **4** and wiring **7***a*, **7***b* are an example of a "charge and discharge path" of the present invention. Also, the specific load **60** is an example of a "load" of the present invention.

The inverter **3** has a function for converting the direct-current power outputted from the generated-power output unit **2** to alternating current. The power generated by the generated-power output unit **2** is supplied via the inverter **3** to the power storage unit **7**, the general load **70**, and the power system **50**.

The specific load **60** is a device operated by an alternating-current power source. The specific load **60** can be a device that runs all of the time and needs a constant supply of power from the power source. Power is usually supplied to a specific load **60** from the power storage section **71** of the power supply unit **7**. When power is not supplied from the power storage section **71**, it is supplied from the bus line **4**. The general load **70** is also a device operated by an alternating-current power source. Power is supplied to the general load **70** from the generated-power output unit **2** via the inverter **3**. Power is also supplied from the power system **50**.

In the first embodiment, the specific load **60** is a lighting fixture or a constantly operating device. Therefore, the amount of power consumed by the load is limited, and the capacity of the power storage section **71** is selected based on the amount of power consumed. For example, the capacity is at least twice the daily amount of power used by a specific load **60**. This allows power to be supplied to a specific load **60** when there is no generated power from the generated-power output unit **2** on account of insufficient sunlight, or when there is a power outage. The specific load **60** can also be an electrical outlet. Here, the power storage capacity can be designed, for example, to take into account the maximum capacity of the inverter **74***a*.

The generated-power output unit **2** includes a plurality of photovoltaic modules **21** (five in the first embodiment) which are connected to each other electrically. The photovoltaic modules **21** are an example of a "power-generating module" of the present invention. The photovoltaic modules **21** can be composed of various types of solar cells, including thin-film, crystal, and compound semiconductor solar cells.

The following is an explanation of the configuration of the power storage unit **7**.

As shown in FIG. **1**, the power storage unit **7** primarily includes a power storage section **71** for storing power from the bus line **4**, an AC-DC converter **72** for converting alternating-current power to direct-current power, a charge-discharge control box **73** for controlling the charging and discharging of the power storage section **71**, an inverter unit **74** for supplying power to a specific load **60** from the power storage section **71**, and a control box **75** for controlling devices such as the power storage section **71**, the AC-DC converter **72**, and the charge-discharge control box **73**. These devices are housed inside a case **76**, and can be handled as a single unit.

Also, the power storage unit **7** is installed outdoors. The power storage unit **7** has wiring **7***a* for receiving power from the bus line **4**, and wiring **7***b* for supplying power to a specific load **60**.

Also, rechargeable batteries (for example, lithium-ion storage batteries) with very little natural discharge and high charge-discharge efficiency are used as the power storage section **71**.

More specifically, in the first embodiment, the power storage section **71** includes three lithium-ion storage batteries **711***a*-**711***c* connected in parallel. The rate voltages of the lithium-ion storage batteries **711***a*-**711***c* are substantially equal. Switches **712***a*, **712***b* and **712***c* are connected, respectively, to the three lithium-ion storage batteries **711***a*, **711***b* and **711***c*. The switches **712***a*-**712***c* are turned ON to connect the lithium-ion storage batteries **711***a*-**711***c* to the bus line **4** or specific load **60**. ON/OFF control of the switches **712***a*-**712***c* is controlled by the control box **75**. Here, a lithium-ion storage battery is not necessarily a single cell. It can also be a single battery pack including a plurality of cells and a power-level gauge.

The charge-discharge control box **73** includes three switches **73***a*, **73***b* and **73***c* that can be switched ON and OFF by the control box **75**. Switches **73***a* and **73***b* are connected in series to the charge and discharge path between the AC-DC converter **72** and the power storage section **71**. A diode **73***d* for rectifying the current flowing from the AC-DC converter **72** to the power storage section **71** is provided in the bypass path arranged in parallel to switch **73***a*. Switch **73***c* is provided in the discharge path between the power storage section **71** and the inverter unit **74**.

When the power storage section **71** is charged by the bus line **4**, switch **73***b* is first turned ON and then switch **73***a* is turned ON. In this way, reverse current flow from the power storage section **71** to the AC-DC converter **72**, which is caused by low output voltage after the AC-DC converter **72** starts up, can be prevented by the diode **73***d*.

When power is discharged from the power storage section **71** to a specific load **60** via the inverter unit **74**, switch **73***c* is turned ON. Also, switch **73***a* is turned ON, followed by switch **73***b*. In this situation, reverse current flow from the power storage section **71** to the AC-DC converter **72** can be similarly prevented by the diode **73***d*. When all of the switches **73***a*, **73***b* and **73***c* have been turned ON, both charging and discharging of the power storage section **71** can be performed.

The inverter unit **74** includes an inverter **74***a* serving as a DC-AC converter for supplying DC power from the power storage section **71** to a specific load **60** operated by an AC power source, and a switch **74***b* that can be turned ON or OFF. Switch **74***b* is provided between wiring **7***a* and wiring **7***b*. Switch **74***b* is usually turned OFF. In the inverter unit **74**, switch **74***b* is turned ON when power is not being supplied to the inverter **74***a*, preferably when power above a predetermined voltage is not being supplied to the inverter **74***a*.

Also, a switch **77** that can be turned ON or OFF is provided between the AC-DC converter **72** and a contact between wiring **7***a* and switch **74***b*. This switch **77** is turned ON and OFF depending on the temperature of a temperature sensor **75***a* provided inside the control box **75**. In other words, when the temperature of the temperature sensor **75***a* is equal to or less than a predetermined temperature (for example, approximately 70 degrees), switch **77** is turned ON and power is supplied from the bus line **4** to the AC-DC converter **72**. When the temperature of the temperature sensor **75***a* exceeds a predetermined temperature, switch **77** is turned OFF and the electrical connection between the bus line **4** and the AC-DC converter **72** is disconnected. ON/OFF control of the switch **77** is performed by the control box **75**.

Because the power for the control box **75** is received from the wiring between the switch **77** and the AC-DC converter **72**, power is cut off and operation of the control box **75** automatically stops when the switch **77** is turned OFF. When the control box **75** is stopped, output from the AC-DC converter **72** is turned OFF (the supply of power to the AC-DC controller **72** is cut off), and switches **73***a* and **73***c* are turned OFF. When switch **73***c* is turned OFF, the supply of power to the inverter **74***a* is cut off. Because the supply of power to the inverter **74***a* is cut off, switch **74***b* is turned ON as mentioned above. When switch **74***b* is turned ON, power from the bus line **4** can be supplied to a specific load **60** via wiring **7***a*, switch **74***b* and wiring **7***b* instead of via the power storage section **71**. Power for the control box **75** can be received from a lithium-ion storage battery. In this situation, switches can be switched to supply operating power from a lithium-ion storage battery to the control box **75** even though power is not being supplied from the system.

A temperature sensor **78** and an exhaust fan **79** are provided inside the case **76**. The exhaust fan **79** can be activated to discharge heat from inside the case **76** when the temperature detected by the temperature sensor **78** is equal to or greater than a predetermined temperature (approximately 40° C.). The temperature sensor **78** and the exhaust fan **79** are not connected to the other devices inside the case **76** (the power storage section **71**, the control box **75**, etc.), and are operated by power received from wiring **7***a*. As a result, the temperature sensor **78** and the exhaust fan **79** operate independently from the other devices inside the case **76** (the power storage section **71**, the control box **75**, etc.), even when switch **77** is turned OFF.

The control box **75** controls the output from the AC-DC converter **72**, the switches **73***a*-**73***c* of the charge-discharge control box **73**, switch **74***b* of the inverter unit **74**, and switch **77** on the basis of the power level of the power storage section **71**, the detection results of the temperature sensor **75***a*, and the current time (whether or not it is nighttime). More specifically, the control box **75** determines on the basis of the detection result from the temperature sensor **75***a* that overheating has occurred when the temperature inside the case **76** is equal to or greater than a predetermined temperature (for example, the temperature inside the control box **75** is approximately 70° C.), turns ON switch **74***b*, and turns OFF switch **77**. In this way, thermal damage to the various devices inside case **76** can be reduced. Under normal conditions (when overheating has not occurred), ON/OFF control of the charge/discharge control box **73**, the AC-DC converter **72**, and switches such as switch **74***b* of inverter unit **74** are controlled on the basis of a predetermined program.

During normal operation, for example, the control box **75** can control the switches so that the power storage section **71** is charged by the power system **50** late at night, and power is supplied night or day to a specific load **60** from the power storage section **71** when a specific load **60** needs power. When power is supplied to the power supply section **71** from the bus line **4** in order to charge the power supply section **71**, the current path passes through the wiring **7***a*, switch **77**, AC-DC converter **72**, switch **73***a* and switch **73***b*. When power is discharged from the power storage section **71** in order to supply power to a specific load **60**, the current path passes through switch **73***c*, inverter **74***a*, and wiring **7***b*. Power stored in the power storage section **71** is not supplied to the power system **50**.

In the first embodiment, the control box **75** controls the switches so that power is discharged from the lithium-ion storage batteries **711***a*, **711***b* and **711***c* in the power storage section **71** to a specific load **60** while the lithium-ion storage batteries **711***a*-**711***c* are being recalibrated. Also, the control box **75** controls the switches so that the lithium-ion storage batteries **711***a*-**711***c* are charged by power supplied from the generated-power output unit **2** or the power system **50** when the lithium-ion storage batteries **711***a*-**711***c* are being charged during recalibration.

The control box **75** turns the switches **712***a*-**712***c* in the power storage section **71** ON or OFF to connect a portion of the lithium-ion storage batteries (for example, lithium-ion storage battery **711***c*) to the bus line **4** or specific load **60** for correction (recalibration), and to disconnect the rest of the lithium-ion storage batteries (for example, lithium-ion storage batteries **711***a* and **711***b*) from the bus line **4** or a specific load **60**. When this has been done, the capacity value of the lithium-ion storage battery **711***c* being corrected is corrected by discharging and discharging the lithium-ion storage battery **711***c* being corrected. After the capacity value of the one lithium-ion storage battery **711***c* has been corrected, the control box **75** connects lithium-ion storage batteries **711***a* and **711***b*, which were disconnected from the charge and discharge path during correction, to the bus line **4** or a specific load **60**, and the capacity values of lithium-ion storage batteries **711***a* and **711***b* are corrected in successive order to correct the capacity values of all three lithium-ion storage batteries **711***a*-**711***c*.

Also, in the first embodiment, the control box **75** almost completely discharges the portion of lithium-ion storage batteries (for example, lithium-ion storage battery **711***c*) being corrected, and then corrects the lower limit of the capacity of the lithium-ion storage battery **711***c*. Afterwards, charging of the lithium-ion storage battery **711***c* is started. When the voltage of the lithium-ion storage battery **711***c* is substantially equal to the voltage of the other lithium-ion storage batteries (for example, lithium-ion storage batteries **711***a* and **711***b*) which are not being corrected, lithium-ion storage battery **711***c* is connected along with lithium-ion storage batteries **711***a* and **711***b* to the bus line **4** or a specific load **60**. Afterwards, with the lithium-ion storage battery **711***c* being corrected and lithium-ion storage batteries **711***a* and **711***b* not being corrected connected to the bus **4**, the control box **75** corrects the upper value of the capacity of the lithium-ion storage battery **711***c* by almost completely charging the lithium-ion storage battery **711***c*. Lithium-ion batteries **711***a* and **711***b* are charged at the same time. Here, completely discharging and charging a battery means discharging and charging a battery to a level set by the user, who has taken into account the characteristics of the batteries and the performance of the batteries as a system. For example, in the case of a lithium-ion storage battery with a full charge of 4.2 V as a characteristic of the battery, complete discharge of the battery can be set as an inter-terminal voltage of 3 V, and complete charge (full charge) of the battery can be set as an inter-terminal voltage of 4 V. Also, an almost complete discharge or charge means discharging or charging the battery, respectively, to the lower value or upper value of the capacity which are the correction points. For example, the correction points do not have to match the fully discharged state (3 V:SOC=0%) and the fully charged state (4 V:SOC=100%) set by the user. For example, lower value correction can be complete when the voltage corresponding to SOC=5% has been reached. Here, discharge to a voltage corresponding to SOC=5% means the battery has been almost completely discharged.

Also, the control box **75** controls the discharge of the power storage section **71** so that the capacity of the power storage section **71** does not fall below the prohibited discharge threshold value (for example, 50% of the full charge state) when the power storage section **71** is discharged under normal operating conditions. The prohibited discharge threshold value can be set to take into account the power consumption level of a specific load **60**. For example, the prohibited discharge threshold value can be set so that the amount of power consumed by a specific load **60** over one day or several days is stored. The control box **75** changes the switches to stop the supply of power to a specific load **60** from the power storage section **71** and supply power to a specific load **60** directly from the bus line **4** when it has been determined that the capacity of the power discharge section **71** has fallen below the prohibited discharge threshold value.

Because the supply of power from the power system **50** stops under emergency conditions such as a power outage, the control box **75** is stopped. Switch **77** and switches **73***a* and **73***b* are also turned OFF. Because power is not supplied to the AC-DC converter **72** because of this, operation of the AC-DC converter **72** also stops. When a voltage line signal is inputted from the wiring **7***a* to switch **73***c* and a power outage occurs, the absence of voltage from the wiring **7***a* is detected, and switch **73***c* is turned ON. As a result, the inverter **74***a* is operated using a supply of power from the power storage section **71**, and power can be supplied to a specific load **60**.

The discharge is also controlled so that the power level of the power storage section **71** does not fall below the prohibited discharge threshold value (for example, 50%) during normal operation. As a result, when discharge of the power storage section **71** to a specific load **60** is initiated during an emergency situation such as a power outage, a power level greater than the prohibited discharge threshold value (50% of the full charge state) is available without fail in the power storage section **71**. During a power outage, the absence of voltage in the wiring **7***a* is detected and switch **73***c* is turned ON to allow for a discharge even when the power level of the power storage section **71** is below the prohibited discharge threshold value (50% of the full charge state). In this embodiment, lithium-ion storage batteries are used as the power storage section **71**. Therefore, unlike a lead battery from which a complete discharge is undesirable because of sulfation, nearly all of the stored energy can be discharged. In an emergency situation, the supply of power to the control box **75** is discontinued. During this time, switch **73***c* cannot be switched ON or OFF. However, stored power is available by using the lithium-ion stored batteries.

The following is an explanation of the physical configuration (arrangement of devices, etc.) in the power storage unit **7**.

As shown in FIG. **2** and FIG. **3**, the power storage unit **7** contains three box-shaped lithium-ion storage batteries **711***a*-**711***c* in a box-shaped case **76**, a box-shaped charge-discharge control box **73**, a box-shaped control box **75**, and a box-shaped power conversion unit **700** having an inverter unit **74** and an AC-DC converter **72**. The lithium-ion storage batteries **711***a*-**711***c* can be pack-like battery units in which a plurality of lithium-ion cells are connected in series or in parallel. The power storage section **71** includes these three lithium-ion storage batteries **711***a*-**711***c*. These five devices (the three lithium-ion storage batteries **711***a*-**711***c*, the charge-discharge control box **73**, the control box **75** and the power conversion unit **700**) are arranged in parallel so as to be adjacent to each other in the lateral direction. As shown in FIG. **3**, the control box **75** and the power conversion unit **700** are adjacent to each other. In the power conversion unit **700**, the inverter unit **74** is arranged on the control box **75** side. In other words, the AC-DC converter **72** is arranged at a position separated from the control box **75** by the inverter unit **74**. A temperature sensor **75***a* is arranged in the control box **75** on the inverter unit **74** side. The exhaust fan **79** is disposed on the upper side surface of the case **76**, and a temperature sensor **78** is arranged at a position adjacent to the exhaust fan **79**.

When the temperature inside the case **76** is greater than a predetermined temperature (approximately 40° C.), the heat accumulated inside the case **76** is discharged from the upper portion of the case **76** via the exhaust fan **79**. Also, a communication unit (not shown) is provided in lithium-ion storage battery **711**, the charge-discharge control box **73**, and the power conversion unit **700** to allow the state of each device (for example, the temperature) to be communicated to the control box **75**. The lithium-ion storage batteries **711***a*-**711***c* are connected in series to each other using a daisy chain pattern, and the three lithium-ion storage batteries **711***a*-**711***c* are treated as a single unit in the communication process.

The following is an explanation with reference to FIG. **4** through FIG. **8** of the operations performed by the control box **75** during recalibration of the lithium-ion storage batteries **711***a*-**711***c* in the power storage unit **7** of the first embodiment. Recalibration of the lithium-ion storage batteries **711***a*-**711***c* is performed, for example, every three months. During the recalibration of the lithium-ion storage batteries **711***a*-**711***c* performed every three months, one lithium-ion storage battery is recalibrated each day over a series of three days.

First, during normal operations, as shown in FIG. **5**, the switches **712***a*-**712***c* are turned ON, and the lithium-ion storage batteries **711***a*-**711***c* are connected to a specific load **60** (bus line **4**) via the charge-discharge control box **73**. When the lithium-ion storage batteries **711***a*-**711***c* are calibrated, in Step S1 of FIG. **4**, the lithium-ion storage battery **711***a*-**711***c* to be calibrated (corrected) is selected. Here, lithium-ion storage battery **711***c* is selected. In other words, lithium-ion storage batteries **711***a* and **711***b* are not being corrected. Next, in Step S2, as shown in FIG. **6**, switches **712***a* and **712***b* are turned OFF. Also, switch **712***c* remains turned ON. As a result, lithium-ion storage batteries **711***a* and **711***b* are disconnected from a specific load **60**. Lithium-ion battery **711***c* remains connected to a specific load **60**. At this time, switch **73***c* in the charge-discharge control box **73** is turned ON, and switches **73***a* and **73***b* are turned OFF.

Next, in Step S3, power is discharged from lithium-ion storage battery **711***c*. Power discharged from the lithium-ion storage battery **711***c* is supplied to a specific load **60**. Then, in Step S4, it is determined whether or not the discharge of lithium-ion storage battery **711***c* has been completed (completely discharged). In order to determine whether or not discharge of the lithium-ion storage battery **711***c* has been completed, the voltage discharged from the lithium-ion storage battery **711***c* can be detected. When the detected voltage falls below a specified value (close to zero), it is determined that the discharge has been completed. The operation in Step S4 is repeated until it is determined in Step S4 that discharge of the lithium-ion storage battery **711***c* has been completed. Here, in the first embodiment, only one lithium-ion storage battery **711***c* among the three lithium-ion storage batteries **711***a*-**711***c* is being discharged. As a result, the discharge takes approximately one-third of the time required to discharge all three batteries. When it has been determined in Step S4 that the discharge of lithium-ion storage battery **711***c* has been completed, the process proceeds to Step S5, where the current capacity value of the lithium-ion storage battery **711***c* is recorded as the lower limit of the capacity in the control box **75**. In this way, the lower limit of the capacity of the lithium-ion storage battery **711***c* is corrected.

Next, the process proceeds to Step S**6**, where, after turning OFF switch **712***c*, switches **712***a* and **712***b* are turned ON as shown in FIG. **7**. In this way, lithium-ion storage batteries **711***a* and **711***b* are connected to a specific load **60**, and lithium-ion storage battery **711***c* is disconnected from a specific load **60**. In this state, the charge level of lithium-ion storage battery **711***c* is near zero, but lithium-ion storage batteries **711***a* and **711***b* are charged. Therefore, during emergency situations such as a power outage, lithium-ion storage batteries **711***a* and **711***b* can supply power to a specific load **60** if switch **712***c* is turned OFF, and switches **712***a* and **712***b* are turned ON.

Next, the process proceeds to Step S**7**, where, after turning OFF switches **712***a* and **712***b*, switch **712***c* is turned ON as shown in FIG. **8**. In this way, lithium-ion storage batteries **711***a* and **711***b* are disconnected from the bus line **4**, and lithium-ion storage battery **711***c* is connected to the bus line **4**. At this time, in the charge-discharge control box **73**, switch **73***c* is turned OFF, and switches **73***a* and **73***b* are turned ON. Next, the process proceeds to Step S**8**, where lithium-ion storage battery **711***c* is charged by generated-power output unit **2** or power system **50**. If it is daytime, lithium-ion storage battery **711***c* is charged by the generated-power output unit **2** or the power system **50**. If it is nighttime, it is charged by the power system **50**. Step S6 through Step S7 are required when power has to be supplied to a specific load **60** after discharge of lithium-ion storage battery **711***c*. When power does not have to be supplied to a specific load **60** while lithium-ion storage battery **711***c* is being discharged and re-charged, these steps can be omitted.

Next, in Step S**9**, it is determined whether or not the voltage of lithium-ion storage battery **711***c* is equal to the voltage of lithium-ion storage batteries **711***a* and **711***b*. The operation in Step S**9** is repeated while the voltage of lithium-ion storage battery **711***c* is lower than the voltage of lithium-ion storage batteries **711***a* and **711***b*. When it has been determined that the voltage of lithium-ion storage battery **711***c* is equal to the voltage of lithium-ion storage batteries **711***a* and **711***b*, the process proceeds to Step S**10**, where switch **712***c* is turned ON along with switches **712***a* and **712***b* (see FIG. **5**). In this way, lithium-ion storage battery **711***c* is connected to the bus line **4** along with lithium-ion storage batteries **711***a* and **711***b*.

Afterwards, normal operation occurs with lithium-ion storage batteries **711***a*-**711***c* connected to the bus line **4** or a specific load **60**. During normal operation, it is determined in Step S**11** whether or not lithium-ion storage battery **711***c* is fully charged (almost fully charged). When it has been determined that lithium-ion storage battery **711***c* is fully charged, the process proceeds to Step S**12**, where the current capacity value of lithium-ion storage battery **711***c* is recorded in the control box **75** as the upper limit of the capacity. In this way, the upper limit of the capacity of the lithium-ion storage battery **711***c* is corrected. Recalibration of lithium-ion storage battery **711***c* is then complete.

After recalibration of lithium-ion storage battery **711***c* has been completed, the operations in Steps S1-S**12** are performed successively on lithium-ion storage battery **711***a* and lithium-ion storage battery **711***b* in order to recalibrate uncorrected lithium-ion storage batteries **711***a* and **711***b*. In this way, all of the lithium-ion storage batteries **711***a*-**711***c* are recalibrated.

In the first embodiment, as mentioned above, the portion of the three lithium-ion storage batteries **711***a*-**711***c* (for example, lithium-ion storage battery **711***c*) being corrected was connected to the bus line **4** or a specific load **60**, and the other lithium-ion storage batteries (for example, lithium-ion storage batteries **711***a* and **711***b*) not being corrected were disconnected from the bus line **4** or a specific load **60**. By charging and discharging the lithium-ion storage battery **711***c* being corrected in this state, the capacity value of the lithium-ion storage battery **711***c* being corrected is corrected. In this way, the time required to charge and discharge (especially discharge) the lithium-ion storage battery **711***c* is shorter than the time required to correct capacity values by completely charging and discharging all three lithium-ion storage batteries **711***a*-**711***c*. As a result, the capacity value of lithium-ion storage battery **711***c* can be corrected relatively easily, even in situations allowing for long-term discharge such as during a power outage. By discharging lithium-ion storage battery **711***c* being corrected in order to correct the capacity value of lithium-ion storage battery **711***c*, power can be retained in lithium-ion storage batteries **711***a* and **711***b* that are not being corrected. As a result, power can be supplied from lithium-ion storage batteries **711***a* and **711***b*, even when lithium-ion storage battery **711***c* has been completely discharged.

Also, in the first embodiment, as mentioned above, the control box **75** corrects in successive order the capacity values of the three lithium-ion storage batteries **711***a*-**711***c* being corrected. This allows the time required for calibration to be reduced, even when the amount of power consumed by a specific load **60** is small.

In the first embodiment, as mentioned above, the control box **75** almost completely discharges the lithium-ion storage battery being corrected (for example, lithium-ion storage battery **711***c*), and charging of the lithium-ion storage battery **711***c* is initiated after correction of the lower limit of the capacity of the lithium-ion storage battery **711***c*. When the voltage of the lithium-ion storage battery **711***c* is almost equal to the lithium-ion storage batteries not being corrected (for example, lithium-ion storage batteries **711***a* and **711***b*), lithium-ion storage battery **711***c* is connected along with lithium-ion storage batteries **711***a* and **711***b* to a specific load **60**. This can prevent short-circuiting of and damage to the lithium-ion storage batteries **711***a*-**711***c* due to differences in voltage between the lithium-ion storage batteries **711***a*-**711***c*.

In the first embodiment, as mentioned above, the control box **75** almost completely charges the lithium-ion storage battery being corrected (for example, lithium-ion storage battery **711***c*) to correct the upper limit of the capacity of the lithium-ion storage battery **711***c*, while the lithium-ion storage battery **711***c* is connected along with the lithium-ion storage batteries not being corrected (for example, lithium-ion storage batteries **711***a* and **711***b*) to the bus line **4**. In this way, the upper limit of the capacity of the lithium-ion storage battery **711***c* can be easily corrected during normal operation in which the lithium-ion storage batteries **711***a*-**711***c* are connected electrically.

In the first embodiment, as mentioned above, the lithium-ion storage battery to be charged (for example, lithium-ion storage battery **711***c*) is discharged to a specific load **60** connected to the wiring **7***b*. In this way, recalibration can be performed while operating a specific load **60**.

In the first embodiment, as mentioned above, the lithium-ion storage battery to be charged (for example, lithium-ion storage battery **711***c*) is charged by the power system **50** or the generated-power output unit **2** connected to the bus line **4**. In this way, charging can be easily performed using the power system **50** when the power level of the generated-power output unit **2** is low.

2nd Embodiment

The following is an explanation of a power storage system **1** in a second embodiment of the present invention. In the second embodiment, the three lithium-ion storage batteries are connected after being almost fully charged. In the first embodiment, the three lithium-ion storage batteries are connected before the lithium-ion storage battery to be corrected is almost fully charged. The rest of the power storage system is similar to the one in the first embodiment.

In the power storage system **1** of the second embodiment, the control box **75** first almost completely discharges the portion of lithium-ion storage batteries being corrected (for example, lithium-ion storage battery **711***c*), corrects the lower limit of the capacity of the lithium-ion storage battery **711***c*, almost completely charges the lithium-ion storage battery **711***c*, and corrects the capacity of the lithium-ion storage battery **711***c*. Afterwards, the control box **75** almost completely charges the rest of the lithium-ion storage batteries not being corrected (for example, lithium-ion storage batteries **711***a* and **711***b*), and connects lithium-ion storage battery **711***c* along with lithium-ion storage batteries **711***a* and **711***b* to the bus line **4**.

The following is an explanation with reference to FIG. **9** of the recalibration operation performed on the lithium-ion storage batteries **711***a*-**711***c* inside the power storage unit **7** in the second embodiment of the present invention.

Steps S**1** through S**8** of the recalibration operation performed on the lithium-ion storage batteries **711***a*-**711***c* in the second embodiment are similar to those performed on the lithium-ion storage batteries **711***a*-**711***c* in the first embodiment (see FIG. **4**).

In the second embodiment, charging of lithium-ion storage battery **711***c* being corrected is initiated in Step S**8** after discharge of the lithium-ion storage battery **711***c* has been completed. In Step S**19**, it is determined whether or not the lithium-ion storage battery **711***c* has been fully charged (almost fully charged). The operation in Step S**19** is repeated until it has been determined in Step S**19** that the lithium-ion storage battery **711***c* has been fully charged. When it has been determined in Step S**19** that the lithium-ion storage battery **711***c* has been fully charged, the process proceeds to Step S**20**, where the capacity value of the lithium-ion storage battery **711***c* is recorded in the control box **75** as the upper limit of the capacity. When correction of the upper limit and the lower limit of the capacity of the lithium-ion storage battery **711***c* has ended, switch **712***c* is turned OFF, switches **712***a* and **712***b* are turned ON in Step S**21**, and lithium-ion storage batteries **711***a* and **711***b* are charged. In Step S**22**, it is determined whether or not lithium-ion storage batteries **711***a* and **711***b* have been fully charged. When it has been determined in Step S**22** that lithium-ion storage batteries **711***a* and **711***b* have been fully charged, the process proceeds to Step S**23**, where switches **712***a*-**712***c* in the power storage section **71** are all turned ON, and the lithium-ion storage batteries **711***a*-**711***c* are connected to the bus line **4** or a specific load **60**. Lithium-ion storage batteries **711***a* and **711***b* are then recalibrated one at a time in the same way as lithium-ion storage battery **711***c*.

Because the control box **75** does not have to compare the voltages of the lithium-ion storage batteries **711***a*-**711***c*, the recalibration operation can be simplified in the second embodiment.

The other effects of the second embodiment are the same as those of the first embodiment.

3rd Embodiment

The following is an explanation with reference to FIG. **10** of the power storage system **1***a* in a third embodiment of the present invention. In the third embodiment, the generated-power output unit **2** is connected directly to the power storage section **71**. In the first and second embodiments, the generated-power output unit **2** was connected to the power system **50** via the bus line **4**.

In the power storage system **1***a* in the third embodiment of the present invention, as shown in FIG. **10**, the generated-power output unit **2**, which outputs power generated using sunlight, is connected not to the bus line **4** connected to the power system **50** but directly to the power storage unit **7** via wiring **7***c*. All of the power generated by the generated-power output unit **2** is supplied to a specific load **60** after it has been stored in the power storage section **71**. In other words, the power generated by the generated-power output unit **2** is not supplied directly to a general load **70**. As a result, the power storage system **1***a* does not require an inverter **3** (see FIG. **1**) to convert the direct-current output generated by the generated-power output unit **2** to alternating-current output.

Power can be supplied from the power system **50** to the power storage section **71**. When the lithium-ion storage batteries **711***a*-**711***c* are being recalibrated, the lithium-ion storage batteries **711***a*-**711***c* are charged by power generated by the generated-power output unit **2** or by power supplied from the power system **50**. The rest of the configuration and effects of the third embodiment are similar to those of the first and second embodiments.

All of the embodiments disclosed herein are for illustrative purposes only, and should not be considered limiting in any way. The scope of the present invention is indicated by the scope of the claims and not by the explanation of the embodiments, and includes all modifications with equivalent meaning to the scope of the claims.

For example, in the first through third embodiment, there were three lithium-ion storage batteries **711***a*-**711***c* in the power storage section **71**. However, the present invention is not limited to these embodiments. For example, there can be two lithium-ion storage batteries in the power storage section **71**, or four or more lithium-ion storage batteries in the power storage section.

In the first through third embodiments, the capacities of the three lithium-ion storage batteries **711***a*-**711***c* were corrected one at a time. However, the present invention is not limited to these embodiments. For example, the capacities of two lithium-ion storage batteries among the three lithium-ion storage batteries **711***a*-**711***c* can be simultaneously corrected.

In the first through third embodiments, the rated voltages of the lithium-ion storage batteries **711***a*-**711***c* were substantially equivalent. However, the present invention is not limited to these embodiments. For example, in the variation shown in FIG. **11**, the chargeable voltage of a portion of the lithium-ion storage batteries (for example, lithium-ion storage battery **711***a*) differs from the chargeable voltage of lithium-ion storage batteries **711***b* and **711***c*. Here, a DC-DC converter **713** is installed between lithium-ion storage battery **711***a* and switch **712***a*, and voltage converted by the DC-DC converter **713** is rendered substantially equivalent to the voltages of lithium-ion storage batteries **711***b* and **711***c*.

In the first through third embodiments, the storage batteries can be charged by either the generated-power output unit or the power system. However, the present invention is not limited to these embodiments. For example, either the generated-power output unit or the power system can be installed alone, and the storage batteries can be charged either by the generated-power output unit or the power system alone.

In the first through third embodiments, the three lithium-ion storage batteries are recalibrated over three successive days every three months. However, the present invention is not limited to these embodiments. For example, one of the three lithium-ion storage batteries can be calibrated every month. The storage batteries can also be recalibrated on a day specified by the user.

In the first through third embodiments, power was generated by a photovoltaic module. However, the present invention is not limited to these embodiments. The power-generating module can be a direct-current power-generating device or a power-generating module that generates power using renewable energy such as a wind power generating device.

In the first through third embodiments, lithium-ion storage batteries were used in the power storage section. However, the present invention is not limited to these embodiments. Other rechargeable batteries can be used. For example, nickel-hydrogen storage batteries can be used.

In the first through third embodiments, a device operated by an alternating-current power source was the specific load **60**. However, it can also be a device operated by a direct-current power source. Here, a DC-DC converter for DC-DC current voltage conversion is used between the power storage section **71** and the specific load **60** instead of an inverter **74***a* for DC to AC voltage conversion. Alternatively, the power storage section **71** and the specific load **60** can connected directly to each other. Also, the specific load **60** can be a mixture of direct-current loads and alternating-current loads.

In the first embodiment, the lower limit of the lithium-ion storage battery being corrected was corrected, the rest of the lithium-ion storage batteries not being corrected were connected electrically, and the upper limit of the lithium-ion storage battery being corrected was corrected. However, the present invention is not limited to this embodiment. For example, the lower limit of the lithium-ion storage battery being corrected can be corrected, the lithium-ion storage battery being corrected can be charged, and the lithium-ion storage battery being corrected and the rest of the lithium-ion storage batteries not being corrected can be connected electrically when the voltage of the lithium-ion storage battery being corrected is substantially equal to the voltage of the lithium-ion storage batteries not being corrected.

In the third embodiment, the power storage section **71** can be charged by the power system **50** and the power stored in the power storage section **71** cannot be discharged to the bus line **4**. However, the present invention is not limited to this embodiment. For example, the present invention can be configured so that the power storage section **71** is not charged by the power system **50** and the power stored in the power storage section **71** can be discharged to the bus line **4**.

What is claimed is:

1. A power storage unit comprising a plurality of storage batteries connected to a charge and discharge path in parallel via a charge and discharge path and a plurality of switches, and a control unit for ON/OFF control of the plurality of switches,

wherein the control unit turns ON a portion of the plurality of switches to connect a portion of the plurality of storage batteries to the charge and discharge path for correction, and corrects capacity values of the portion of the plurality of storage batteries by charging and discharging the portion of the plurality of storage batteries while switches other than the portion of the plurality of switches are turned OFF to disconnect storage batteries other than the portion of the plurality of storage batteries from the charge and discharge path;

wherein the control unit, after correcting the capacity values of the portion of the plurality of storage batteries, turns OFF the portion of the plurality of switches, and turns ON at least a portion of the switches other than the portion of the plurality of switches to connect at least a portion of the other storage batteries to the charge and discharge path, and corrects the capacity values of at least the portion of the other storage batteries.

2. A power storage unit according to claim **1**, wherein the electric power charged to the plurality of storage batteries is not discharged to a power system but rather is discharged to a load connected to the charge and discharge path.

3. A power storage unit according to claim **1**, wherein the plurality of storage batteries is charged by either a power system connected to the charge and discharge path, or an electric generator generating power using renewable energy.

4. A method for correcting capacity values of a plurality of storage batteries connected in parallel via a charge and discharge path and a plurality of switches, the method comprising:

controlling the plurality of switches to connect at least a portion of the plurality of storage batteries to the charge and discharge path for correction, and to disconnect storage batteries other than the portion of the plurality of storage batteries from the charge and discharge path;

almost completely discharging the portion of the plurality of the storage batteries to correct the lower limit of the capacity of the portion of the plurality of the storage batteries; and

almost completely charging the portion of the plurality of the storage batteries to correct the upper limit of the capacity of the portion of the plurality of the storage batteries;

wherein the correcting the upper limit of the capacity of the portion of the plurality of the storage batteries further comprises:

initiating the charging of the portion of the plurality of the storage batteries;

comparing the voltage of the portion of the plurality of the storage batteries to the voltage of the storage batteries other than the portion of the plurality of storage batteries;

controlling the plurality of switches to connect the storage batteries other than the portion of the plurality of storage batteries to the charging and discharging path when the results of the comparison are substantially equal; and

almost completely charging both the portion of the plurality of the storage batteries and the storage batteries other than the portion of the plurality of storage batteries to correct the upper limit of the capacity of the portion of the plurality of the storage batteries.

5. A method for correcting the capacity values of a plurality of storage batteries according to claim **4**, further comprising the steps of: controlling the plurality of switches to disconnect the portion of storage batteries from the charge and discharge path, and to connect the other storage batteries to the charge and discharge path; charging the other storage batteries, and determining whether or not the other storage batteries have been fully charged; and controlling the plurality of switches to connect the portion of storage batteries to the charge and discharge path when the results of the determination are that the other storage batteries have been fully charged.

6. A power storage system comprising a power storage unit including a charge and discharge path connected to a power system, an electric generator generating power using renewable energy, and a load, a plurality of storage batteries connected in parallel via the charge and discharge path and a plurality of switches, and a control unit for ON/OFF control of the plurality of switches to control the charging and discharging of the plurality of storage batteries, wherein the control unit of the power storage unit turns ON a portion of the plurality of switches to connect a portion of the plurality of storage batteries to the charge and discharge path for correction, and, after turning OFF the other switches to disconnect the other storage batteries from the charge and discharge path, and discharging power from the portion of storage batteries to the load, corrects capacity values of the portion of the plurality of the storage batteries by charging the portion of the plurality of the storage batteries using either the power system or the electric generator;

wherein the control unit, after correcting the capacity values of the portion of the plurality of the storage batteries, turns OFF the portion of the plurality of the switches, and turns ON at least a portion of switches other than the portion of the plurality of the switches to connect at least a second portion of the plurality of the storage batteries other than the portion of the storage batteries to the charge and discharge path, and corrects the capacity values of at least the second portion of the plurality of the storage batteries.

7. The power storage system of claim **6**, wherein the electric power charged to the plurality of storage batteries is not discharged to a power system but rather is discharged to a load connected to the charge and discharge path.

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